## REMARKS

This is in response to the Office Action dated October 2, 2003. New claims 8-17 have been added; and claim 7 has been canceled. Thus, claims 1-6 and 8-17 are now pending.

The title and drawings stand objected to in paragraphs 1-2 of the Office Action. The title has been amended above; and the drawing objection has been addressed and overcome by the changes to the specification set forth above.

### General

For purposes of example, and without limitation, certain example embodiments of the instant invention relate to a semiconductor device including an nMOS transistor including a channel region in a carbon-inclusive silicon layer and/or a pMOS transistor including a channel region in a SiGe inclusive layer. Referring to Fig. 1 of the instant application for example, the semiconductor device includes p-well 2, n-well 3, isolation regions 7, SiGe film 4, carbon inclusive silicon film 5, silicon film 6, source/drain regions 12, 13, gate insulator 8, and gate electrodes 11. Even though the nMOS and pMOS transistors are on the same substrates, they have *different channel regions*. In particular, the channel region of the nMOS transistor is mainly in the carbon-inclusive silicon film 5, whereas the channel region of the pMOS transistor is mainly in the SiGe inclusive film 4 (e.g. pg. 10, lines 19-22). Advantageously, electron mobility can thus be improved (e.g., pg. 15, line 5 to pg. 16, line 14).

Moreover, in certain example embodiments, utilizing a difference in lattice constants having a relationship of *SiGe>Si>SiC* surprisingly allows for strain/compression distortion to be increased with the film stack thereby permitting improved hole mobility and/or high speed operation to be achieved (e.g., pgs. 15-16).

Claim 2

Claim 2 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over alleged Admitted Prior Art (APA) in view of Takagi. This Section 103(a) rejection is respectfully traversed for at least the following reasons.

Claim 2 requires a p-channel device having a *channel region formed in the silicon germanium film*. The cited art fails to disclose or suggest this aspect of claim 2.

In contrast with claim 2, for instance, Takagi's p-channel device has a channel region in the carbon-containing film (col. 22, lines 25-27). Thus, if, as the Office Action alleges, the SiGe layer 23 of the APA were replaced with the SiGeC layer of Takagi, the channel would still be in the carbon-containing SiGeC layer – not in the claimed silicon germanium film which is clearly different than the claimed C containing film. Thus, even the alleged combination fails to meet the invention of claim 2. No cited reference discloses of suggests the claimed p-channel device having a stack comprising SiGe/SiC/Si, where the channel is mainly in the SiGe film. The cited art is entirely unrelated to this aspect of claim 2.

Claim 1

Claim 1 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over alleged Admitted Prior Art (APA) in view of Takagi. This Section 103(a) rejection is respectfully traversed for at least the following reasons.

Claim 1 as amended requires that the pMOS and nMOS transistors have different channel regions, wherein the channel region of the pMOS is mainly in the SiGe film and the channel region of the nMOS on the same substrate is mainly in the C-containing silicon film. For example and without limitation, see Fig. 1 of the instant application which illustrates p-well 2, n-well 3, isolation regions 7, SiGe film 4, carbon inclusive silicon film 5, silicon film 6, source/drain regions 12, 13, gate insulator 8, and gate electrodes 11. Even though the nMOS and pMOS transistors in Fig. 1 are on the same substrates, they have *different channel regions*. In particular, the channel region of the nMOS transistor is mainly in the carbon-inclusive silicon film 5, whereas the channel region of the pMOS transistor is mainly in the SiGe inclusive film 4 (e.g. pg. 10, lines 19-22). Advantageously, electron mobility can thus be improved (e.g., pg. 15, line 5 to pg. 16, line 14). The cited art fails to disclose or suggest the aforesaid underlined aspect of amended claim 1, either alone or in combination.

The Office Action admits that the APA fails to disclose or suggest the aforesaid underlined aspect of claim 1. Moreover, Takagi teaches directly away from this aspect of claim 1 because Takagi uses the *same* film for the channel in both the n and p type device (col. 22, lines 5-7 and 25-27). In contrast, *claim 1 requires different channel regions* for

the n and p channel devices. Thus, either alone or in combination, the cited art fails to disclose or suggest the requirement of claim 1 that the channel region of the pMOS is mainly in the SiGe film and the channel region of the nMOS on the same substrate is mainly in the C-containing silicon film.

Other Claims

Claims 8-9 require that the carbon-containing silicon film consists essentially of silicon and carbon. This clearly excludes films 63 and 53 of Takagi which include 20% Ge (col. 22, line 29). Thus, the cited art fails to disclose or suggest this aspect of claims 8-9, either alone or in combination.

Claim 14 requires that the channel in the n-channel device is mainly in a film consisting essentially of carbon and silicon. Again, this excludes the films 63 and 53 of Takagi, since these films contain 20% Ge. Thus, the cited art fails to disclose or suggest this aspect of claim 14, either alone or in combination.

Claims 15-17 require that "a lattice constant of the carbon-containing silicon film is less than respective lattice constants of the silicon germanium film and the silicon film, and wherein the lattice constant of the silicon film is less than the lattice constant of the silicon germanium film." For example, utilizing difference in lattice constants having a relationship of *SiGe>Si>SiC* surprisingly allows for compression distortion to be increased with the film stack of the invention thereby permitting improved hole mobility and high speed operation to be achieved (e.g., pgs. 15-16). The cited art fails to disclose or suggest this aspect of claims 15-17. Instead, Takagi teaches directly away from this

aspect of claims 15-17 since Takagi's middle layer 53 (or 63) appears to have a lattice constant higher than that of the silicon layer 54 (or 64) – the opposite of what these claims require. There is absolutely no teaching or suggestion in the cited art of the lattice constant relationship *SiGe>Si>SiC*, let alone the surprising and unexpected results associated therewith.

Conclusion

For at least the foregoing reasons, it is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By: _____
Joseph A. Rhoa
Reg. No. 37,515

JAR:caj
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100